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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,741	01/17/2002	Yoshinobu Ono	3885-0103P	2546

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EXAMINER

MULPURI, SAVITRI

ART UNIT PAPER NUMBER

2812

DATE MAILED: 03/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/046,741

Applicant(s)

ONO ET AL.

Examiner

Savitri Mulpuri

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/9/2004 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted prior art in combination with Narui (publication from Journal of Crystal Growth).

Admitted prior art teaches a method of making a semiconductor device:

Providing a GaAs substrate; growing buffer GaAs layer; successively growing multiple AlGaAs layers with first AlGaAs (aluminum content 0.4), second AlGaAs layer (aluminum content 0.15) and third AlGaAs layer (aluminum content 0.4) and additional GaAs. Admitted prior art teaches when AlGaAs layer having higher Al content is grown on AlGaAs having lower Al content, multi layer AlGaAs is prone to internal football-shaped abnormal growth and such problem is illustrated in fig.3. Admitted prior art

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teaches all layers are grown on flat GaAs substrate as claimed in claims 5-14(see page 1, section (0006) and fig. 3).

Admitted prior art does not teach AlGaAs layer having high aluminum content is grown at lower growth rate than the growth rate of AlGaAs layer having lower aluminum content.

Admitted prior art does not teach growing AlGaAs having higher Al content at lower growth rate than the growth rate of AlGaAs having lower Al content.

Nauri teaches successively growing GaAs layer on GaAs substrate; growing plurality of AlGaAs layers with AlGaAs with Al content 0.45, AlGaAs with Al content 0.14, AlGaAs with Al content 0.45, AlGaAs with Al content 0.45, AlGaAs aluminum content 0.45, wherein Al content greater than 0.4 is grown at a growth rate of 0.16 nm/sec. It would have been obvious to one of ordinary skill in the art to modify the invention of the admitted prior art by growing AlGaAs layers with higher Al content on AlGaAs with lower Al content at lower growth rate for the benefit of obtaining smooth surface.

Response to Arguments

Applicant's arguments filed on 3/9/2004 have been fully considered but they are not persuasive. Applicant argues that Narui teaches growing AlGaAs on a ridge GaAs substrate as opposed to flat GaAs substrate as recited in instant invention. However Narui is relied on the teaching of AlGaAs with higher AlGaAs at slower growth rate 0.16 nm/sec to grow smooth AlGaAs layer and such growth results low threshold current without forming reflection coating (see conclusion section). Admitted prior art teaches

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the sequence of the multilayer AlGaAs structure i.e., GaAs/AlGaAs heterostructure as instantly claimed sequence of layers and stresses that when AlGaAs with higher Al content is grown on AlGaAs with lower Al content in AlGaAs multilayer structure results internal foot-ball shaped abnormal growth, which was depicted in figure.3. Modified invention, as modified by the teaching of AlGaAs having higher Al content by Narui, would give defect free AlGaAs multilayer structure, when AlGaAs grown at lower growth rate on flat GaAs substrate. Instant invention requires one only condition that AlGaAs with higher Al content is grown over flat GaAs substrate at lower growth rate. Whether the surface is flat or not, AlGaAs with higher Al content grown at lower growth rate would give smooth AlGaAs layer.

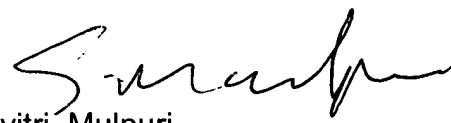
Applicant argues that the examiner turns to applicant's own disclosure for obviousness rejection. However, such argument is invalid because Admitted prior art as disclosed in background invention includes the problem of foot-ball shaped abnormal growth, when AlGaAs with higher Al content is grown on AlGaAs with lower Al content. Conclusively, modified invention of Admitted prior art would not have defects as was resulted by instant claimed process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Savitri Mulpuri whose telephone number is 571-272-1677. The examiner can normally be reached on Mon-Fri from 7 to 4.30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Savitri Mulpuri
Primary Examiner
Art Unit 2812